MEMORANDUM

To: Kamyar Guivetchi, DWR

CC: Michael Perrone, DWR, B160 Advisory Committee Members

From: Spreck Rosekrans and Ann Hayden

Date: November 20, 2003

Subject: Quantification of Unmet Environmental Objectives in State Water Plan 2003 using actual flow data for 1998, 2000, and 2001.

As requested, we are re-submitting the following summary of our preliminary analysis of selected environmental flow objectives that are currently not being met. We greatly appreciate the feedback we recently received from DWR staff and have incorporated suggestions accordingly, as discussed in greater detail below. Due to time constraints, this analysis was conducted on only a partial list of objectives; we strongly encourage DWR to conduct a more comprehensive analysis of unmet environmental objectives statewide.

Statewide, numerous environmental flow objectives exist that continue to go unmet, such as those designed to support federal and State legal mandates to double salmon populations. The purpose of our analysis is to identify and quantify these gaps. Whether these objectives are adequately met under these alternative scenarios in the State Water Plan update is a matter for staff and AC consideration, but we hope that providing a quantified summary of such objectives will shed some light on what is actually occurring.

At the core of many of these environmental flow objectives is the goal of re-creating a portion of the natural hydrograph in systems impaired by water storage projects. By establishing appropriate flows, riverine ecosystems processes can be maintained, sustaining river channels and riparian vegetation corridors, and ultimately supporting expanded and stable aquatic species populations.

The primary difference between this updated analysis and our previous analysis is the use of actual flow data for 1998, 2000, and 2001 representing various year types. We used this actual data at the request of staff who suggested that, to be consistent with the rest of Bulletin 160, we should not use the CALSIM model for projected flows.

It should be noted, however, that significant policy changes have taken place since 2001. Interior's 2003 B2 policy accounts for operational changes very differently, and has recently significantly limited how much water is available to meet the AFRP flow objectives. Therefore, the unmet objectives for the American and Stanislaus Rivers discussed below, as well as unmet objectives on the Sacramento River, are likely to be significantly higher today than they were in 2000 and 2001. We ask DWR to quantify this deficiency in Bulletin 160.

As a preliminary analysis, we chose the following objectives to be quantified:

- Trinity River flows consistent with Trinity River Mainstem Restoration Plan ROD (fall 2000).
- Additional water required meeting the flow objectives in the "Final Restoration Plan for the Anadromous Fish Restoration Program" (2001).
- A level of protection in the Bay-Delta that is equivalent to that specified by CALFED ROD, and required for long-term ESA assurances. This includes a viable Environmental Water Account, the Interior decision for CVPIA B2 water that allows crediting within metrics (i.e. pre offset-reset ruling) and a fully functional Tier 3.
- San Joaquin flows needed to comply with the federal court order to restore the salmon fishery below Friant Dam.
- All Level 4 Refuge Supplies.
- The Ecosystem Restoration Program purchases identified in the CALFED ROD for Stage One implementation to be used to meet the flow objectives outlined in the CALFED Final EIR/EIS (July 2000).
- San Joaquin River flows at Vernalis consistent with levels specified in the 1995 Water Quality Control Plan.

A preliminary assessment of quantified unmet environmental objectives for these locations is provided in a summary table and discussion below. It's worth mentioning that there is considerable variability in the extent to which there is conflict between meeting these objectives and meeting water delivery objectives for the urban and agricultural sectors.

Summary

Our analysis suggests the following unmet quantities for the selected environmental objectives. Note that in some cases, there would be an effect on consumptive use and in other cases no effect. For example, American River flows might be recaptured in the Delta, while Trinity River flows would not be recaptured.

	American (Nimbus)	**Stanislaus (Goodwin)**	**ERP #1**	**ERP #2.**	**ERP #4 Freeport (Dayflow)**	**Trinity (Lewiston)**	**SJR at Vernalis (Dayflow)**	**SJR below Friant**	**Level 4 Refuges**	**Total (TAF)**
WY 1998	25	7	0	0	0	168	97			297
WY 2000	55	34	0-126	65-496	0	344	96			529
WY 2001	81	0	0-204	76-224	242	99	62			485
Total	**162**	**41**	**0-330**	**141-720**	**242**	**611**	**256**	**349-445**	**125**	**1926-2930**

American River

Existing American River flows were identified on the California Date Exchange Center (CDED) database website as the flows below Nimbus reservoir. Objectives for the American River are outlined in the Anadromous Fish Restoration Program[1]. This analysis determined an annual average deficiency of environmental flows of 25 TAF in 1998, 55 TAF in 2000, and 81 TAF in 2001, for a total deficiency of **162 TAF**.

Stanislaus River

Existing Stanislaus River flows were identified on the CDEC database as the flows below Goodwin dam. Objectives for the Stanislaus River are outlined in the AFRP. This analysis determined an annual average deficiency of environmental flows of 7 TAF in 1998, 34 TAF in 2000, 0 TAF in 2001, for a total deficiency o f **41 TAF**.

Ecosystem Restoration Program

The CALFED Ecosystem Restoration Program focuses on the connection between meeting the flow needs on the Sacramento, Feather, Yuba, American, Mokelumne, Tuolumne, and Merced Rivers and the freshwater inflow needs in the Delta. The ERP includes three quantifiable flow objectives for each year type, including Target 1: March outflow, Target 2: late-April to early May outflow, and Target 4: May flows on the Sacramento River[2]. For the purposes of this analysis, for Target 2, we assumed the ERP pulse flow would occur in the wetter period, which typically was in April. For all the targets, the target flows had to occur for ten days and we assumed flat flows across the month. Existing flows for each of these targets are identified using Interagency Estuary Project (IEP) Dayflow database. This analysis determined the following average deficiency of environmental flows: ERP #1: 0 TAF in 1998, 0-126 TAF in 2000, 0-204 TAF for 2001, for a total deficiency of **0-330 TAF**. ERP #2: 0 TAF in 1998, 65-496 TAF in 2000, 76-224 TAF in 2001, for a total deficiency of **141-720 TAF**. ERP #4: 0 TAF in 1998, 0 TAF in 2000, 242 TAF in 2001, for a total deficiency of **242 TAF.**

Trinity River

Existing Trinity River flows were identified on the CDEC database as the flows below Lewiston Reservoir.[3] Daily flow objectives for the Trinity River are from the Trinity River ROD. This analysis determined an average deficiency of environmental flows of 168 TAF in 1998, 344 TAF in 2000, and 99 TAF in 2001 for a total deficiency of **611 TAF**.

San Joaquin River at Vernalis

Existing flows for the San Joaquin at Vernalis were identified using Dayflow data. Flow objectives at Vernalis are identified in the 1995 Water Quality Control Plan and occur from

[1] Final Program for the Anadromous Fish Restoration Program, 2001
[2] "Volume II: Ecosystem Restoration Program Plan, Sacramento-San Joaquin Delta Ecological Management Zone Vision," July 2000, pages 97-99.
[3] http://cdec.water.ca.gov/

April 15-May 15. This analysis determined an average deficiency of 97 TAF in 1998, 96 TAF in 2000, and 62 TAF in 2001, for a total deficiency of **256 TAF**.

San Joaquin River

San Joaquin River flow objectives are based on a URS Report[4], completed as part of the settlement process between NRDC and the Friant Water Users Authority. Currently, 117 TAF flow are annually released down the San Joaquin River to satisfy downstream prior-right riparian water user and contract objectives.

The environmental flow objectives for the San Joaquin River are provided in the water quality study and determined an annual average deficiency of **349-445 TAF.**

Level 4 Refuges

As prescribed in the CVPIA, Level 4 Refuge Water is the water needed in addition to current average annual water deliveries (Level 2 Refuge Water) to 19 Sacramento and San Joaquin refuges[5]. Incremental Level 4 water is based on 10% increments of water to be delivered to the refuges until year 10 (2002) when it was expected the full amount would be attained. To date, this amount has not been largely due to funding limitations and the growing cost of water (e.g.: average cost of water has increased from $50-60/af in 1995 to $125-$150/af in just eight years). Moreover, necessary construction of refuge conveyance systems has not occurred at a number of refuges, further limiting the supply of water to the refuges. In all, the unmet environmental water needs at Level 4 Refuges totals **125 TAF.**

EWA and B2

The B2 Account and EWA are environmental obligations prescribed in the CVPIA and CALFED ROD, respectively, to provide benefits to fisheries and aquatic habitat in the Central Valley and Bay-Delta. In terms of B2, Interior's most recent 2003 policy for managing B2 supplies has significantly diminished the amount of water available for protection and restoration. As for the EWA, while protective operations have had some positive effects on aquatic habitat and the health of the Delta's fisheries, gaps in this account still exist. The size and operation of the EWA is currently being revised in light of changes to state and federal water operations.

While the above preliminary analysis provides much needed information on unmet needs, there are still many other environmental water objectives that need to be quantified. A truly comprehensive analysis would include environmental water legal mandates that occur statewide, extending from the Klamath River in the north to the Salton Sea in the south. Even in the Bay-Delta, more quantification is necessary. Unfortunately, while data exists to analyze some of these objectives, there are significant gaps in data collection throughout

[4] "Water Supply Study: Development of Water Supply Alternatives for Use in Habitat Restoration for the San Joaquin River", URS, 2003.
[5] Summary of Refuge Needs, Dale Garrison, USFWS, 2003.

the state--a fact that requires serious attention and action from relevant agencies. We strongly encourage DWR to fill these data gaps where possible and complete a total assessment of unmet environmental objectives throughout the state.

Format of Attached Spreadsheet

Sheet name: "Calculated Unmet Objectives"

AFRP (American River):

E11-E1471: Actual flow data for American River at Nimbus WY 1998-2001 (using CDEC)
F11-F1471: AFRP flow objectives
G11-F1471: Unmet environmental need calculation (Flow objective – Actual Flow = Unmet Need)
G8: Average Unmet need
G2-G4: Total unmet need (TAF) for 1998, 2000, and 2001.

AFRP (Stanislaus River):

J11-J1471: Actual flow data for Stanislaus River at Goodwin WY 1998-2001 (using CDEC)
K11-K1471: AFRP flow objectives
L11-L1471: Unmet environmental need calculation (Flow objective – Actual Flow = Unmet Need)
L8: Average Unmet need
L2-L4: Total unmet need (TAF) for 1998, 2000, and 2001.

ERP #1:

P11-P1471: Actual delta outflow data for WY 1998-2001 (Using Dayflow)
Q11-Q1471: ERP #1 flow target
R11-R1471: Unmet environmental need calculation (Flow objective – Actual Flow = Unmet Need)
Q8: Average Unmet need
Q2-Q4: Minimum total unmet need (TAF) for 1998, 2000, and 2001.
R2-R4: Maximum total unmet need (TAF) for 1998, 2000, and 2001.

ERP #2:

U11-I1471: Actual delta outflow data for WY 1998-2001 (using Dayflow)
V11-V1471: ERP #2 flow target
W11-W1471: Unmet environmental need calculation (Flow objective – Actual Flow = Unmet Need)
W8: Average Unmet need

W2-W4: Minimum total unmet need (TAF) for 1998, 2000, and 2001.
X2-X4: Maximum total unmet need (TAF) for 1998, 2000, and 2001.

ERP #4:

AA11-AA1471: Actual flow data for Freeport for WY 1998-2001 (using Dayflow)
AB11-AB1471: ERP #4 flow target
AC11-AC1471: Unmet environmental need calculation (Flow objective – Actual Flow = Unmet Need)
AC8: Average Unmet need
AC2-AC4: Total unmet need (TAF) for 1998, 2000, and 2001.

San Joaquin at Vernalis:

AF11-AF1471: Actual flow data for SJR River at Vernalis for WY 1998-2001 (using Dayflow)
AG11-AG1471: Pulse period objective
AH11-AH1471: Unmet environmental need calculation (Flow objective – Actual Flow = Unmet Need)
AH8: Average Unmet need
AH2-AH4: Total unmet need (TAF) for 1998, 2000, and 2001.

Trinity River:

AL11-AL1471: Actual flow data for Trinity River at Lewiston for WY 1998-2001 (using CDEC)
AM11-AM1471: Trinity flow objective
AN11-AN1471: Unmet environmental need calculation (Flow objective – Actual Flow = Unmet Need)
AN8: Average Unmet need
AN2-AN4: Total unmet need (TAF) for 1998, 2000, and 2001.

Remaining sheets in spreadsheet provide summary information, actual flow data, and flow objective data.